



## LAB ACTIVITY:

# HEAT, TEMPERATURE AND CONDUCTION

### OBJECTIVE: Students will:

- ✚ Conduct/observe an activity in which heat is transferred from hot water to metal washers and then from hot metal washers to water.
- ✚ Understand the differences and the relationship between heat and temperature;
- ✚ Describe and draw a model, on the molecular level, showing how energy is transferred from one substance to another through conduction.

**MATERIALS:** (Note: This activity can be done as a demonstration or as a hands-on for students).

### For the Teacher

- 1 Styrofoam cup
- Thermometer
- Hot plate or coffee maker
- Large beaker or coffee pot

### For Each Group

- 2 sets of large metal washers on a string
- Styrofoam cup filled with hot water
- Room-temperature water
- 2 thermometers
- Graduated cylinder or beaker

### PROCEDURE:

1. Read and discuss the information in the introduction with the class.
2. Use a string to tie 5 - 6 metal washers together. Each group of students will need two sets of washers, each tied with string.
3. Hang one set of washers for each group in hot water on a hot plate or in water in coffee maker so that the washers can get **HOT**. These washers will need to remain hot until the second half of the activity.

## Teacher Sheet 2

4. The other set should be left at room temperature and may be distributed to students along with the materials for the activity.
5. Immediately before the activity, pour about 30 milliliters (2 tablespoons) of hot water (about 50 °C) into a Styrofoam cup for each group. Be sure to pour one cup of hot water for you to use as a control.
6. Ask students to predict what will happen to the temperature of the water and the washers if you place the washers into the hot water and write their prediction on their activity sheet.
7. Tell students that they are going to see if the temperature of hot water changes as a result of placing room-temperature metal washers in the water. The only way to tell if the washers cause the temperature to change is to have a cup of hot water without washers. Explain that you will have this cup of hot water, which will be the control.
8. You will need to place your thermometer in the cup of hot water at the same time the students do.
  - ✓ Have students record the initial temperature of the control in their charts on the activity sheet, along with the initial temperature of their own cup of hot water. The temperature of the two samples should be about the same.
9. Place a thermometer in your cup to measure the initial temperature of the water. Record the temperature of the water in the "Before" column in the chart on the activity sheet. Be sure to also record the initial temperature of the water in the control cup.
10. Use another thermometer to measure the temperature of the washers. Record this in the "Before" column.
11. With the thermometer still in the water, hold the string and lower the metal washers all the way into the hot water.
  - ✓ Observe any change in the temperature of the water.
  - ✓ Leave the washers in the water until the temperature stops changing.



- ✓ Record the temperature of the water in each cup in the "After" column.

12. Remove the washers from the water. Then take and record the temperature of the washers in the "After" column.



13. Students should then complete the activities on their **Student Sheet**.

**EXPECTED RESULTS:** The temperature of the water will decrease a bit and the temperature of the washers will increase a bit. The amount of temperature decrease and increase is really not that important. What is important is that there is a temperature decrease in the water and a temperature increase in the washers.

